USPTO # 11 no Reason 3495

5/17/95

Exhibit C

Exhibit C

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

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CONTROL NUMBER	FILING DATE	PATENT UNDER REEXAMINATION	ATTORNEY DOCKET NO.
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EXAMINER	
CARROLL, J	
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OFFICE ACTION IN REEXAMINATION

[X] Responsive to the communication(s) filed on 24 March and 26 April 1995. [ ] This action is made FINAL.

A shortened statutory period for response to this action is set to expire 2 (TWO) month(s) from the date of this letter. Failure to respond within the period for response will cause termination of the proceeding and issuance of a reexamination certificate in accordance with this action. 37 CFR 1.550(d). EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).

PART I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. [XX] Notice of References Cited by Examiner, PTO-892.
2. [ ] Information Disclosure Citation, PTO-1449.
3. [ ] Notice of Informal Patent Drawing, PTO-948.
4. [ ] _____.

PART II SUMMARY OF ACTION:

1a. [XX] Claims 1 to 20 are subject to reexamination.
1b. [ ] Claims _____ are not subject to reexamination.
2. [ ] Claims _____ have been cancelled.
3. [XX] Claims 1, 2, 4/1, 5/1, 6, 9, 10, 11/1, and 12/11/1 are confirmed.
4. [XX] Claims 15 is ~~are~~ patentable.
5. [XX] Claims 3, 4/3, 5/3, 7, 8, 11/3, 11/7, 11/8, 12/11/3, are rejected.
6. [XX] Claims 12/11/7, 12/11/8, 13, 14 and 16 to 20 are ~~objected to~~ rejected.
7. [ ] The formal drawings filed on _____ are acceptable.
8. [ ] The drawing correction request filed on _____ is [ ] approved, [ ] disapproved.
9. [ ] Acknowledgment is made of the claim for priority under 35 U.S.C. 119. The certified copy has [ ] been received, [ ] not been received, [ ] been filed in Serial No. _____ filed on _____.
10. [ ] Since the proceeding appears to be in condition for issuance of a reexamination certificate except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11, 435 O.G. 213.
11. [ ] Other

cc: Requester

We have entered as Paper No. 7 the DECLARATION OF ALEXANDER LIDOW, the DECLARATION OF TOYU YAZAKI, as Paper No. 8 the AMENDMENT filed concurrently on 24 March 1995, and, as Paper No. 10, the SUPPLEMENTAL AMENDMENT filed 26 April 1995.

On amendment pages 29 to 31 the Patent Owner provides convincing reasons for us to withdraw the double patenting rejections over Lidow et al. '699. The Patent Owner most importantly indicates that Lidow et al. '699 does not disclose, suggest or claim a MOSFET with identical base regions as disclosed, claimed and required in Lidow et al. '725. The Patent Owner, thus, could not have claimed in the '699 Patent the identical base regions of the '725 Patent because the '699 Patent disclosure was insufficient to support the identical base regions of the '725 Patent, notwithstanding the fact that the Patent Owner has further amended the Claims of the '699 Patent in parallel Reexam 3490. As we discuss infra, the Patent Owner additionally provides convincing reasons showing that certain insufficiencies of the Takakuwa reference and Hendrickson Patent preclude their further application.

Thus, for at least the reasons set forth supra, we vacate the double patenting rejections applied in Paper No. 6.

On amendment pages 26 to 29 the Patent Owner provides convincing reasons for us to withdraw Claim rejections over the Hendrickson Patent and supporting documentation as applied in Paper No. 6. Most importantly, even granting our conclusion that Ishitani provides one with ample motivation to proceed from an undesirable V-gate MOSFET, consistent with the V-gate MOSFET

disclosed by Hendrickson with Figure 14 and reproduced as Figure J in Paper No. 6, the Patent Owner convincingly argues that one is necessarily obliged to maintain the single base-frame configuration that Ishitani disclosed with Figures 5 and 6 therein, rather than the separate base regions we posed with Figure K of Paper No. 6, at least because Ishitani does not teach or suggest use of the equally spaced base regions of Patent Claims 1, 3 and 7, and the first and second base regions of Patent Claim 8. Although Hendrickson discloses separate source and drain surface regions for lateral conduction type MOSFETs illustrated with Figures 1 to 8 and Figures 10 to 13 therein, they are different in kind from the V-gate vertical conduction type MOSFET array shown with Figure J in Paper No. 6. Hendrickson thus provides one with little and insufficient guidance to surmise as we have in Paper No. 6 that P-type base regions (25) shown with Figure J are constituted as the claimed equally spaced, first and second base regions shown in Figure K.

For at least the reasons set forth supra, we vacate the Claim rejections over the Hendrickson Patent previously applied in Paper No. 6.

As an aside, the Requester urged on Request pages 25, 50 and 51 that the Krishna article, Reference AP provided by the Requester, teaches the obviousness for one to have substituted a lateral DMOS of Figure 1a for a vertical DMOS of Figure 1b. We have declined to accordingly apply the Krishna article because we are unable to discern any basis whatsoever that would support the Requester's characterization of Krishna. We instead find that Krishna reports in the technical literature results from an

analysis aimed at obtaining a better understanding of secondary breakdown failure mode for the transistors shown in Figures 1a and 1b therein. Krishna characterizes the transistors as D-MOS and V-MOS transistors that have been recently developed by others, evidently from reference 11 cited on page 876 to support the D-MOS transistor.

For the reasons expressed supra we are unable to verify the Requester's characterization of the Krishna article.

On amendment pages 14 to 25 the Patent Owner provides convincing reasons, supported by the Yazaki Declaration, for us to withdraw the Claim rejections over the Takakuwa reference applied in Paper No. 6. We cited the McElroy translation of the Takakuwa reference on page 4 of Paper No. 6 to support our position that Takakuwa envisaged an alternative embodiment where-by one forms a "mesh pattern" for base region (18) shown with Figures A and B. We excerpt the sentence spanning McElroy translation pages 6 and 7 as follows.

> "It is also possible to form region (18) and region (12s) on top of it in such a way that when seen from the face (10a) side they form a mesh pattern, and the drain region (12d) fits within the interstices of that mesh."

We envisage a mesh as comprising a solid lattice-work defining openings therein. Using Okabe et al. '878 as a guide we found it wholly consistent to have disposed the Takakuwa base regions (18) in the openings of the mesh, and to have disposed drain region (12d) in the solid lattice-work of the mesh to occupy the intersticial space between the separate base regions in the open-

ings. The so-called IR translation provides consistency as evidenced by the following excerpt from translation page 7.

> "Alternatively, the region (18) and the region (12s) to be formed thereon may be formed into a mesh-like pattern as viewed from the surface (10a) to have the drain region (12d) in the nets of the mesh or otherwise formed into a pattern having a plurality of belts (e.g., two) to have them face each other."

We found it wholly consistent to have disposed base regions (18) in the openings of the mesh, and to have disposed drain region (12d) "in the nets of the mesh", that seemed equivalent to the solid lattice-work locations. The Patent Owner offers another disposition of base and drain regions at odds with the structure as we envisaged supra and in Paper No. 6. But for the Yazaki Declaration we would have granted the Patent Owner's perception of Takakuwa as an obvious but inapplicable alternative, but would have maintained our position as being equally valid because of its consistency with the available English translations. Deferring to the Yazaki Declaration we conclude that our perception of the obvious Takakuwa MOSFET array as shown with Figure D of Paper No. 6 is contrary to the clearly expressed description by Takakuwa as discerned by one sufficiently well versed in the Japanese language to appropriately weight a nuance that others have missed. The Resume of Toyu Yazaki amply supports our characterization that Toyu Yazaki is well versed in the Japanese language. Toyu Yazaki more particularly declares in paragraph 3 that the drain region appears inside the eyes/openings of the net, as opposed to the base region as we have envisaged in Paper No. 6. Thus, in the IRX translation one would have instead understood Takakuwa as disposing

> "[...] the drain region (12d) in the eves/openings [nets] of the mesh [...]";

in the McElroy translation one would have instead understood Takakuwa as disclosing

> "[...] the drain region (12d) fits within the eves/openings [interstices] of that mesh."

We perforce conclude that Takakuwa expected to form, and one would have understood Takakuwa as forming a mesh pattern whereby drain region (12d1) comes to the face (10a) at a plurality of eyes/openings locations, and a single base-frame region (18) occupies the surrounding lattice-work defining the drain-occupied eyes/openings at surface (10a).

Giving full weight and deference to the opinions declared by Toyu Yazaki, we find the Yazaki Declaration is sufficient to vacate the Claim rejections over the Takakuwa reference as applied in Paper No. 6.

Epiloque

We obtained an independent English translation of the Takakuwa document, presently provided as Reference R, wherein its corresponding sentence under discussion appears at the top of translation page 8, as excerpted infra.

> "In still another embodiment the region (18) and the region (12s), which is formed above it, are patterned in a meshy fashion as they are viewed from the plane (10a) side in such a way that drain region (12d) will face the mesh matrix interior."

In noting similarities among the translations, we find a single unified concept is adequately conveyed by an initial portion of the sentence in each translation, i.e.,

> as {seen, viewed, viewed} from {face, surface, plane} (10a) region (18) and region (12s) {on top, thereon, above} form a {mesh pattern, mesh-like pattern, meshy fashion}.

The parenthetical synonymic words are respectively excerpted from the McElroy, IRX and USPTO translations. We conclude thereby that each translator experienced little and insignificant difficulty because each translation conveyed the same concept using synonymic terminology. As opposed to a single unified concept conveyed by an initial portion, the latter portion of the sentence under discussion was translated differently by each translator, i.e.,

McElroy	"[...] drain region (12d) fits within the interstices of that mesh.";
IRX	"[...] drain region (12d) in the nets of the mesh [...]";
USPTO	"[...] drain region (12d) will face the mesh matrix interior."

We conclude thereby that each translator experienced some significant difficulty because each translation uses nonsynonymic terminology and is ambiguous to a degree. More particularly, "interstices" of the McElroy translation leads one to place drain region (12d) at a space that intervenes between things, with the ambiguity due to either a space between eyes/openings of the mesh, i.e., the solid lattice-work, or due to a space between the solid lattice-work of the mesh, i.e., the eyes/openings. More particulary, "nets of the mesh" of the IRX translation leads one to place drain region (12d) at a space either in the eyes/open-

ings of the mesh, or in the solid lattice-work of the mesh, inasmuch as "nets" and "mesh" are synonyms, each comprising lattice-work defining openings. More particularly, "will face the mesh matrix interior" of the USPTO translation leads one either to place drain region (12d) in the eyes/openings of the mesh so that the drain may "face the mesh matrix interior", i.e., the solid lattice-work, or, to place drain region (12d) in the lattice-work of the mesh so that the drain may "face the mesh matrix interior", i.e., eyes/openings. We settle the ambiguities by deferring to the Yazaki Declaration because Toyu Yazaki is not only a translator but, . most importantly, an able interpreter, as evidenced by at least the declared first paragraph and the Resume as being a highest graded interpreter as conferred by the US State Department. As resolved supra with respect to the McElroy and IRX translations, we accordingly interpret the USPTO translation as

> "[...] drain region (12d) <u>inside the eyes/openings of the net</u> will face the mesh matrix interior."

Given the presently diminished status of the Takakuwa reference and the Hendrickson Patent as formerly plausible prior art information against the presently amended Patent Claims, we find that the Okabe et al. reference remains as an applicable alternative. On amendment page 21 the Patent Owner more particularly discusses Okabe et al. teaching JFET designs with Figure 1, shown as Figure C in Paper No. 6, according to a conventional layout of separate P-type gate regions of Figure 3 and staggered layout of separate P-type gate regions in Figure 4. The Patent Owner asserts that there is nothing in Okabe et al. that states

or suggests that low concentration impurity regions (10) shown in the MOSFET arrangement of Figure 2 could be analogized to the p-type gate JFET regions (2) of Figure 1.

In response, we respectfully disagree with the Patent Owner's assertion based upon the USPTO translation of Okabe et al., provided as Reference R in Paper No. 6. In a brief reference to Figure 2 on translation page 2 we find evidence in the following excerpt that Okabe et al. would have disagreed with the Patent Owner's assertion.

> "The field effect transistor shown in Fig. 2 also shows the analogous relationship."

In fact, Okabe et al. teach that the MOSFET of Figure 2 may be analogously considered with the JFET of Figure 1. We conclude therefrom that P-type gate (2) of the JFET is analogous to P-type base (10) of the MOSFET, N-type substrate (1) is analogous to N-type substrate (1), and N-plus-type source region (3) of the JFET is analogous to a similar but unreferenced region in the MOSFET, whereby base regions (10), accommodating N-plus-type source regions (16), must be separated from one another by distance 12 in a conventional layout of analogous base regions as in Figure 3, or in a staggered layout as in Figure 4. Understanding that Okabe et al. expected to dispose JFET source regions (3) between and among the distributed fields of JFET gate regions (2), one analogously and accordingly would have been expected to distribute N-type conductive material including the unreferenced N-plus-type material, between and among the distributed fields of MOSFET base regions (2). Further considering that Okabe et al. characterize the MOSFET on translation page 1 as vertical field effect transistor, we perforce conclude that N-type material

between MOSFET base regions (10) adequately functions as the presently claimed vertical common conduction region.

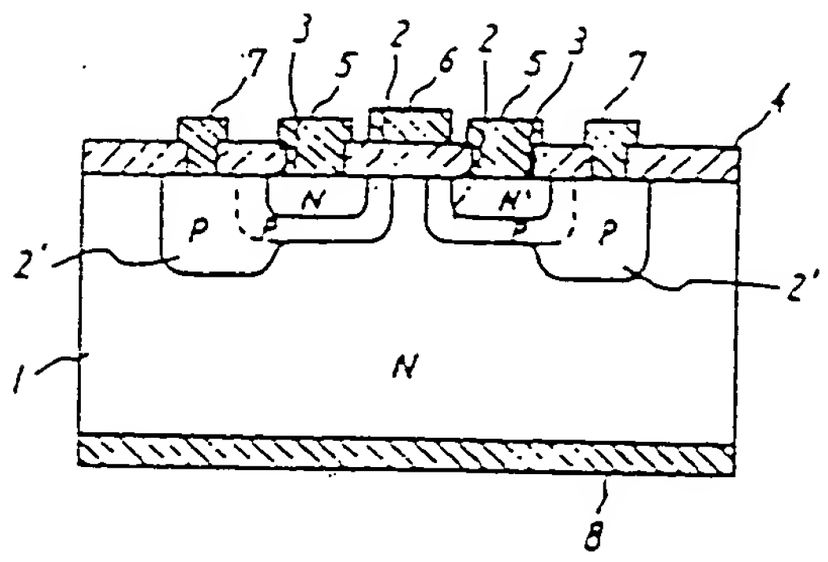
The Patent Owner correctly observes on amendment page 21 that Okabe et al. show gate electrode (11) as facing only the inner surface of base region (10) but not surrounding each base region. The Patent Owner reasonably and correctly concludes that the Figure 2 MOSFET gate arrangement is thereby inconsistent with a MOSFET array having spaced base regions.

In response, understanding that Okabe et al. expected one to distribute analogous MOSFET base regions (10) in either conventional or staggered array fields to achieve a desirably large channel width, after

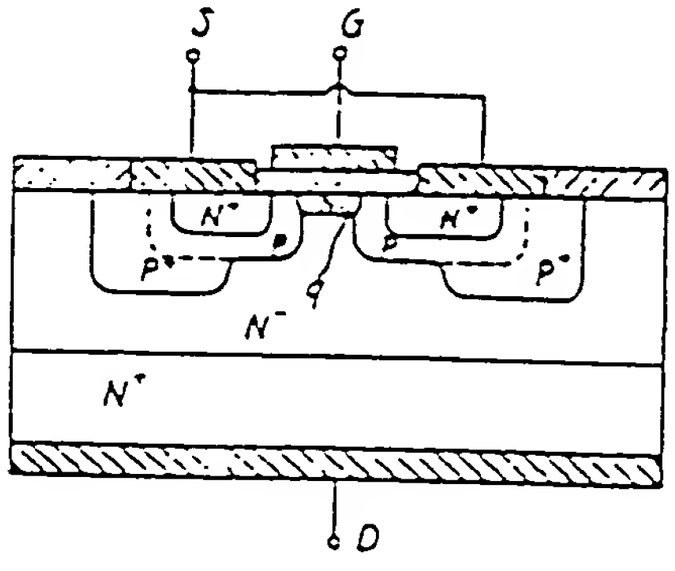
> "[...] since a size of the current is in proportion with a channel width, it is desirable to have a large channel width on the same plane.",

excerpted from translation page 2, we perforce conclude that one would have possessed sufficient common knowledge and common sense to have formed gate electrode (11) to surround each base region so as not to throw away potential channel width that Okabe et al. clearly and unambigously intended to make large. Thus, in transforming the MOSFET of Figure 2 into either array of Figures 3 and 4, one would have changed the gate (11) arrangement of Figure 2 so that the gate electrode would surround each and every base region in the array to make large the channel width.

In further response, we find that the Okabe et al. MOSFET is similar in many respects to Sakai '688 MOSFETs of Figures 5 and



第 6 図



第 7 図

Figure M (Sakai '688
(JAPAN Kokai 52-106688

6, shown here as Figure M, reference of record in Reexam 2478, and the Tihanyi et al. MOSFET of Figure 5, reproduced infra as Figure N, Reference A provided with Paper No. 6. In the sentence beginning on line 58 of column 5 Tihanyi et al. characterize vertical line (20) as a plane of symmetry with elements on one side of the symmetry plane having mirror image elements on the other side of the symmetry plane. Similar planes of symmetry reside at X and Y axes of the conventional MOSFET layout

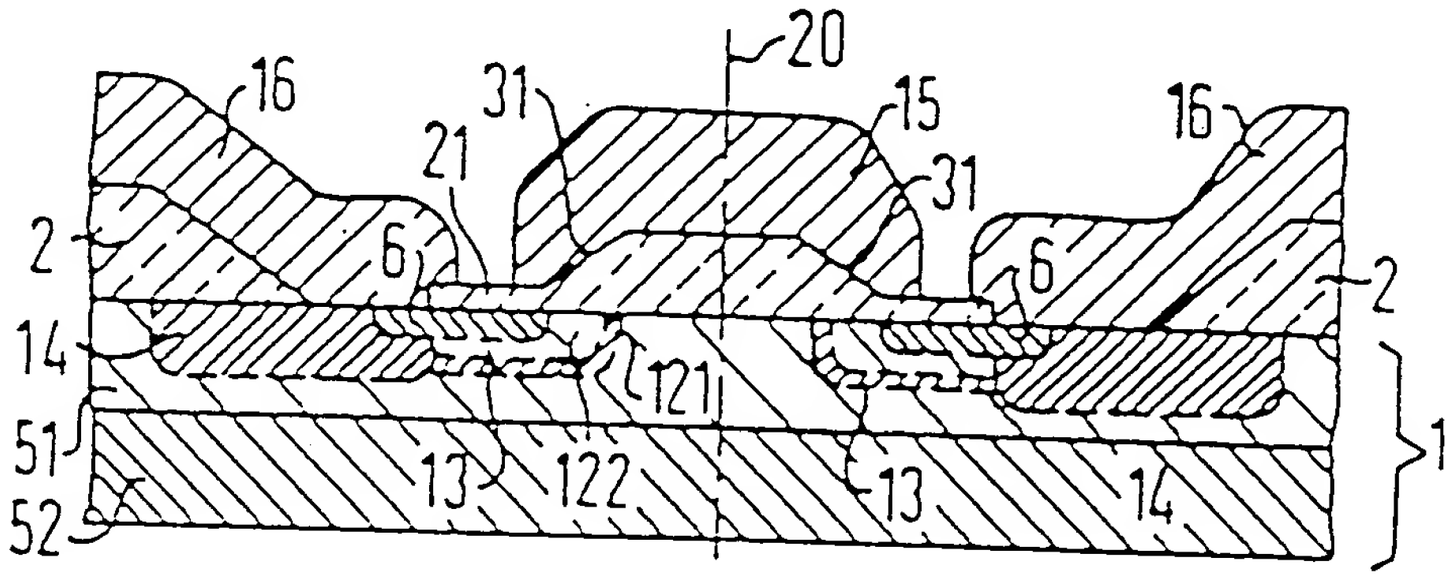


Figure N (Tihanyi et al. MOSFET
(With Plane of Symmetry (20)

shown in Okabe et al. with Figures 1 to 4, reproduced here as Figure O, with Figure 3 therein accordingly annotated. Thus

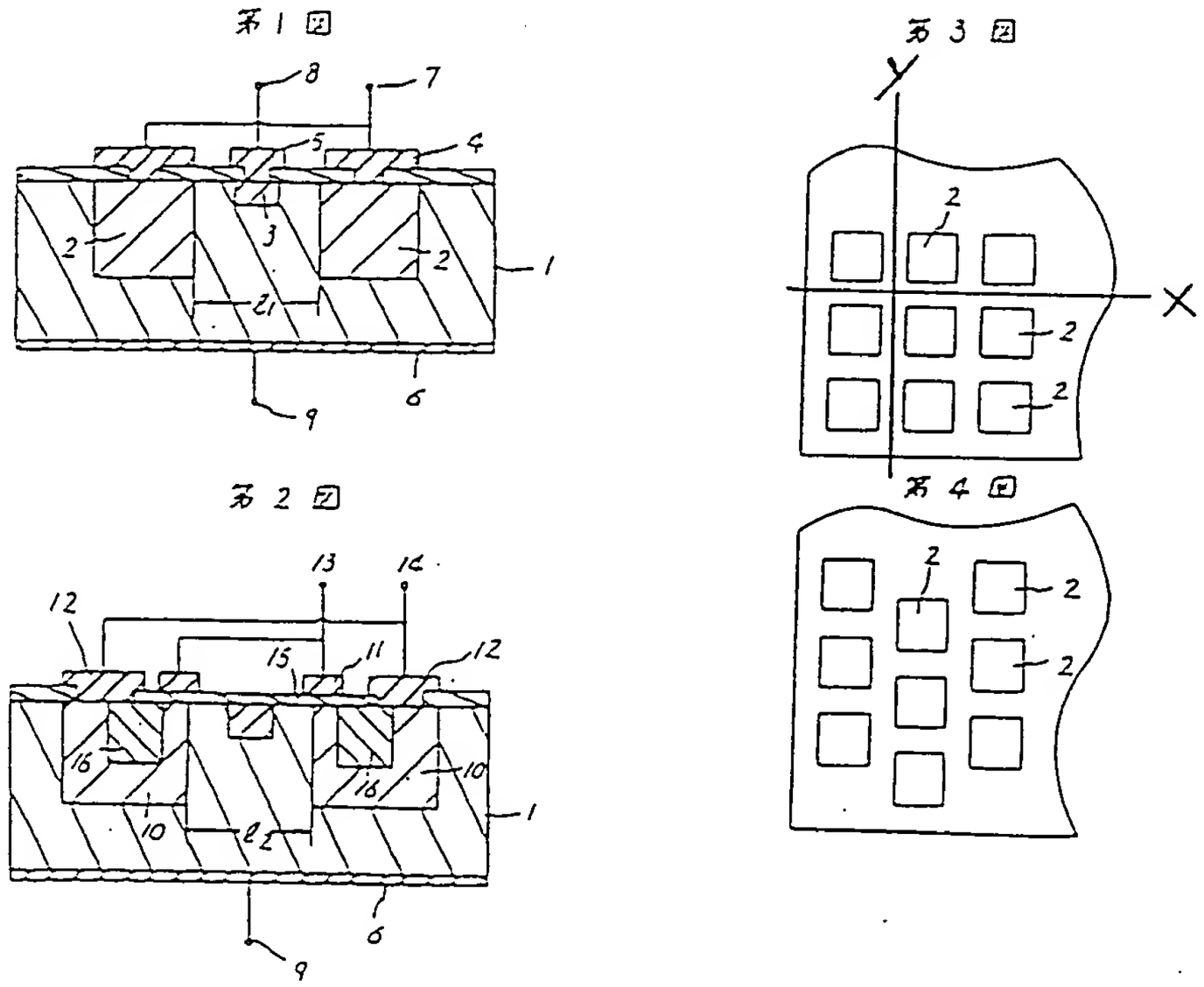


Figure O (Okabe et al. '878
(Analogous MOSFET Array
(of Figure 3 Annotated
(With X and Y Planes
(of Symmetry

in view of Tihanyi et al. as a first alternative, one would have similarly and accordingly distributed the Tihanyi et al. transistor base regions about symmetry plane (20) as distributed about annotated symmetry planes X and Y in Okabe et al. Further in view of Sakai '688 as a second alternative, one would have similarly and accordingly distributed the Sakai '688 base regions (2) (2') of the Figure 6 transistor about symmetry planes X and Y in Okabe et al. Presuming usual patterning conditions obtain in making the Figure 6 embodiment as Sakai '688 used in the process of Figures 5(a) to 5(e), as Tihanyi et al. used to make region (5) in the usual process step of Figure 1 therein, we conclude in view of Sze, Reference S presently provided, that the deeper base regions (2') inherently would possess a radius of curvature larger than shallow base regions (2) to render a MOSFET inherently possessing relatively high breakdown voltages. Sze amply demonstrate with Figure 15 that deeper diffusion regions, formed through a usual mask, possess larger radii of curvature, rj, than do more shallow diffusion regions. After In re Best, 195 USPQ 430 (CCPA 1977), a claim reciting a newly discovered function or property inherently possessed by things in the prior art, does not cause the claim drawn to those things to distinguish over the prior art.

We thus extend onto new grounds the following Claim rejections.

Amended Patent Claims 7, 8, 11/7, 11/8, 14 and newly presented Claims 17, 18, 19 and 20 are rejected under 35 U.S.C. 103, excerpted on page 2 of Paper No. 6, as being unpatentable over considerations of Okabe et al. '878, Sakai '688, and Tihanyi et al., amply discussed supra, but further considered with

Takakuwa and Blanchard et al., References AK and AD provided by the Requester. Takakuwa evidently found it obvious to transform a nonannular source region (12s), shown with Figure 4 on page 404, into an annular source region (12s) shown with amended Figure 4 on page 405, as shown here as Figure P. Discerning the

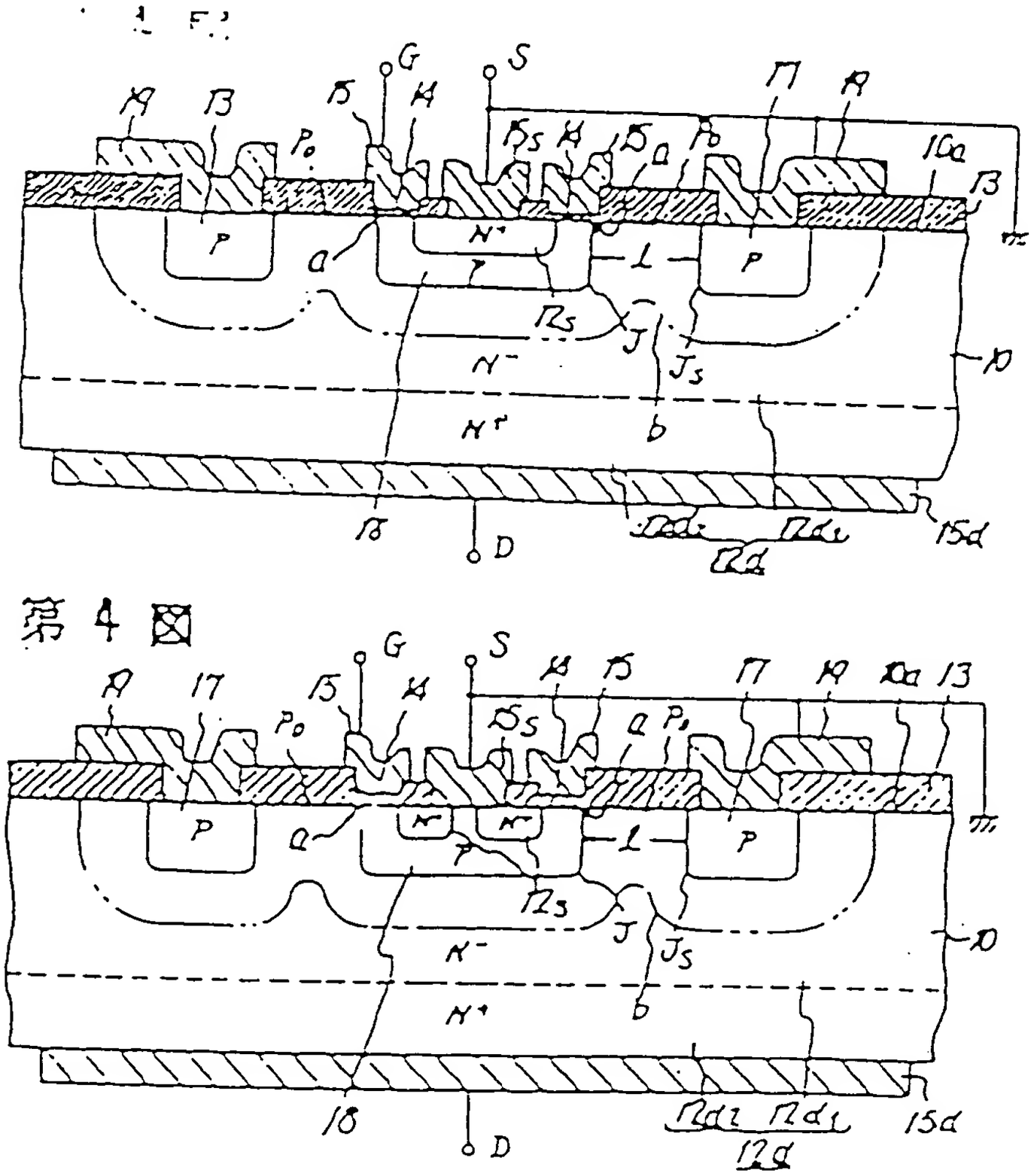


Figure P

(Takakuwa MOSFETs:
(Upper Embodiment With
(Nonannular Source Region
((12s); Lower Embodiment
(With Annular Source
(Region (12s).

disclosure of equivalent alternatives, we thus conclude it to have been obvious for one to have accordingly annularized source regions (16) of Okabe et al. '878, source regions (3) of Sakai '688, and source regions (6) of Tihanyi et al. Blanchard et al. teach the prudent process advantages of using a single source electrode sheet for contacting source regions of a vertical MOSFET array. We thus conclude it to have been prudent and obvious for one to have accordingly contacted source regions (6) of Tihanyi et al., source regions (3) of Sakai '688, and source regions (16) of Okabe et al. '878 instead of source electrode arrangement (16) of Tihanyi et al., source electrode arrangement (5) (S) of Sakai '688, and source electrode arrangment (12) (14) of Okabe et al. '878.

Amended Patent Claims 11/7 and 11/8 are alternatively rejected under 35 U.S.C. 103 as being unpatentable over considerations of Okabe et al., Sakai '688, Tihanyi et al., Takakuwa, Blanchard et al. and Sze, amply discussed supra.

Amended Patent Claims 3, 5/3, 11/3 and 13, and newly presented Claim 16 are rejected under 35 U.S.C. 103 as being unpatentable over the references as applied supra, but further considered with Lisiak et al., Reference AQ provided by the Requester, showing with Figure 7 therein four cross-sections of various planar and nonplanar vertical MOSFET arrays having MOSFET cell lateral repeat distances of 10, 25, 40 and 44 microns. We thus conclude it to have been obvious for one to have accordingly constructed the obvious Tihanyi et al., Okabe et al. and Sakai '688 MOSFET arrays.

Claim 4/3 is rejected under 35 U.S.C. 103 as being unpatentable over the references as applied supra to Claim 3, but further considered with the Krishna article, Reference AP provided by the Requester. Krishna reports results from an analysis aimed at obtaining a better understanding of secondary breakdown failure mode in high voltage lateral and vertical MOS transistors. Krishna found it desirable to provide space between base regions in a vertical MOSFET array

"of the order of microns",

excerpted from the last paragraph on page 877. Krishna in Figure 1b therein posed a range between about one and ten microns. Presuming that about 15 microns, about 0.6 mil, falls within the scope "of the order of microns" envisaged by Krishna, we conclude it to have been obvious for one to have accordingly spaced from one another the base regions of the obvious Okabe et al., Sakai '688, and Tihanyi et al. MOSFET arrays so as to achieve desirable secondary breakdown characteristics as found by Krishna.

Claims 12/11/3, 12/11/7, 12/11/8 and, alternatively, 4/3 are rejected under 35 U.S.C. 103 as being unpatentable over the references as applied supra to Claims 11/3, 11/7, 11/8 and 3, but further considered with Lidow et al. '286, '666, '759 and '699, References AF, AG, AH and AI provided by the Requester, teaching the particularly claimed dimensions.

After M.P.E.P. 2260.01 we allow amended Patent Claims 1, 2, 4/1, 5/1, 6, 9, 10, 11/1, 12/11/1 and newly presented Claim 15 because we are unaware of sufficient prior art information that would have at least suggested the combinations claimed, especially the depth relationships of Claim 6, and the hexagonal lattice,

base and source patterns of Claim 1. Considering the Patent Owner's further explanation of Fakuta on amendment page 23, we find insufficient the guidance in Fakuta, or anywhere else, to proceed from the grooved device of Fakuta to the planar surface device of amended Patent Claim 1 while maintaining the required hexagonal patterns.

The Lidow Declaration executed 23 March 1995 shows IR's total sales employing the '725 Patent amounting to 216.531 megadollars and royalty income in excess of 57 megadollars. While finding secondary considerations of ample commercial success and industry-wide respect, the Declaration is insufficient because it does not break out sales and royalty earnings exclusively due to the '725 Patent. Further discerning a reasonably plausible basis to reject some amended Patent Claims over presently applied Okabe et al. and supporting documentation, we further find insufficient the Declaration to subordinate the rejections.

Attorney Stephen A. Soffen telephoned a request on 24 April 1995 for an interview if we decided not to issue an NIRC. In addition to requiring antecedent bases for certain amendments to Patent Claim 1 and newly presented Claims 15 and 16, I discussed on the 24th and the 25th of April my decision to withdraw the Claim rejections of Paper No. 6 and to extend onto new grounds Claim rejections over Okabe et al. '878, Tihanyi et al. and Takakuwa. Mr. Soffen provided some reasons why he found the combinations unsuitable. I granted another request on the 27th of April for a personal interview to further discuss Okabe et al. and Takakuwa. We did not discuss Sze, Sakai '688, Blanchard et al., Lisiak et al., Krishna and the Lidow et al documents presently applied. We reached no agreement.

We set a period for response of two months from the date of this USPTO action.

An inquiry concerning this communication may be directed to Examiner J. Carroll at telephone number 703-308-4926, or to the Group 2500 Receptionist at telephone number 703-308-0956.

Respectfully Submitted.

JAMES J. CARROLL
EXAMINER
ART UNIT 253

JANICE A. HOWELL
DIRECTOR GROUP 2500